TOPIC: INTRODUCTION TO THE ELEMENTS OF A FIRING OPERATION

TIME FRAME: 1:30

LEVEL OF INSTRUCTION: Level I

BEHAVIORAL OBJECTIVE:

Condition: Given a written quiz

Behavior: The student will confirm knowledge of the elements of a firing operations

Standard: With a minimum 80% accuracy according to the information contained in this lesson

MATERIALS NEEDED:

- Writing board with markers/erasers
- Appropriate audiovisual material/equipment

REFERENCES:

- CAL FIRE Handbook 4300, Fire Protection Training
- Fire Line Handbook, NWCG
- C-234, Intermediate Firing Methods, CAL FIRE, 2009

PREPARATION: Firing teams must develop and execute an operational plan that utilizes appropriate guidelines, techniques and equipment to conduct a successful firing operation. The more knowledge you possess in these areas the more successful you are likely to be.

PRESENTATION	APPLICATION
	SL 4-1-1
	SL 4-1-2
I. SAFETY	
A. Ensure the firing operation does not	
1. Jeopardize the safety of personnel conducting the firing operation	
2. Adversely affect suppression forces in the area	
	SL 4-1-3
II. RESOURCES REQUIRED	
A. Basic functions of the firing operation include:	
1. Lookout(s)/intelligence gathering	
2. Ignition; the lighters and their supplies	
3. Holding and fuel bed preparation; engines, dozers, crews	
B. Supplemental resources include:	
1. Staging of additional firing/holding resources	
2. Equipment for extended mop-up commitments	
	SL 4-1-4
III. LINE-BASED FIRING	
	SL 4-1-5
A. Conduct line-based firing from completed control or wet-lines (vs. interior firing which is not constrained by control lines)	
1. Completed control line	

PRESENTATION	APPLICATION
a) Constructed or existing breaks b) Wet/foam line 2. Favorable locations include a) Ridge tops or on the lee side of the ridge b) Wide canyon bottoms c) Roads or benches	
	SL 4-1-6
B. Direction of progress of overall firing operation 1. Fire into the wind and / or against the slope whenever possible in order to better control the set fire 2. Opposing wind and slope will influence the effects of applied fire. You must determine if wind will overpower the effects of slope. If wind influence will have a greater influence than slope, tactics may need to be altered to achieve desired results.	
	SL 4-1-7
C. Anchor points / check lines 1. Begin firing at an anchor point to prevent uncontrolled fire from out-flanking you	What are some examples of an anchor point?
2. Check lines a) Temporary open-ended lines used to slow the rate of fire spread	

PRESENTATION	APPLICATION
1) Breaks in fuel (streambeds, rocky areas, etc.) 2) Short hand lines 3) Wet or foam lines 4) Air drops	
	SL 4-1-8
	SL 4-1-9
IV. PROBLEMS IN THE FIRE ENVIRONMENT A. Firing through saddles or reversals of slope B. Firing in bottoms of steep canyons C. Firing in brush fields D. Firing in timber E. Adverse fuel conditions F. Adverse weather conditions	
	SL 4-1-10
1. Firing through saddles or slope reversals	
	SL 4-1-11
	SL 4-1-12
	SL 4-1-13
a) Burn simultaneously from each peak down into the saddle	
NOTE: Good communication between lighters is necessary to prevent one from reaching the bottom first, continuing across the saddle bottom, and running fire uphill towards other ignition team	

PRESENTATION	APPLICATION
b) Develop a wider burned zone in the bottom of the saddle	
	SL 4-1-14
2. Firing from the bottom of steep canyons vs. segment firing from top to bottom	
a) Fire high (where canyon sides are farther apart) and progress downward	
b) Minimize intensities to reduce spotting	
c) Progress slowly, and employ extra holding forces for spot fires	
V. DEALING WITH UNFAVORABLE CONTROL LINE CONFIGURATION AND LOCATION	
	SL 4-1-15
A. Firing abrupt bends and corners	
1. Adjust the firing pattern and holding forces to fit the changing direction of fire movement relative to the line	
2. Wind/slope influence affects each line segment differently	
3. Beware of setting lines of fire in tight corners that can then converge and intensify	
	SL 4-1-16
	SL 4-1-17
	SL 4-1-18
	SL 4-1-19
B. Problem with lines running across the slope	

PRESENTATION	APPLICATION
1. Underslung lines	
a) Augment holding forces to control rollouts	
b) Remove or reposition problem fuels	
c) Trench the control line	
2. Fire below the line	
a) Augment holding forces for spot fires	
b) Modify the fuel bed	
c) Lower intensity firing patterns	
NOTE: Discuss hazards of mid slope firing operations	
	SL 4-1-20
C. Switchbacks	
	What problems can switchbacks cause?
1. Switchbacks present unique problems	
	SL 4-1-21
a) Fire environment problems	
1) Switchbacks traverse topographic changes, including changes in aspect and slope	
2) Changes in aspect can also change the fuel bed/loading	
3) Wind speed and direction changes can occur with topographic changes	
b) Operational problems	

PRESENTATION	APPLICATION
1) Narrow and winding roads create traffic problems for firing group 2) Difficulty in holding roads may occur due to narrow and uneven nature of the switchback 3) Makes LCES planning and mitigation more difficult	How can operational problems be mitigated?
NOTE: Operational problems can often be mitigated by conducting firing briefings	**SL 4-1-22**
2. Firing switchbacks a) Determine beginning and termination point b) Break up firing operations into segments c) Determine sequence d) Select firing techniques	**SL 4-1-23**
e) Determine firing method for each segment based upon your examination of: 1) Topographic factors • Aspect • Slope • Shape 2) Depth of burned zone required	

PRESENTATION	APPLICATION
3) Fuel type/loading/condition 4) Wind speed and direction relative to both the line and the slope 5) Inter-relationship of all factors	
	SL 4-1-24
f) Evaluate switchback firing continuously for 1) Fire effects and fire behavior on each segment 2) The effects on other segments that are burning 3) Pace of firing operation 4) Threat to control lines	
NOTE: The following slides reflect upslope or negative wind conditions. Conditions you encounter will always vary. The tactics used on actual events will depend upon the fire environment and the resource capabilities.	
	SL 4-1-25 Proceed at a pace that ensures you do not generate fire intensity that will cause spot fires
	SL 4-1-26
g) Edge or strip fire into the center of the turn, being careful not to generate spot fires across the road	
	SL 4-1-27
h) Establish sufficient burn zone before firing lower section of switchback	

PRESENTATION	APPLICATION
i) Fire out of center of turn, ensuring applied fire does not cross road above you	
	SL 4-1-28
j) Switchbacks can also be fired utilizing spike technique	
	SL 4-1-29
k) Spike fire from upper portion of turn down to the lower portion	
	SL 4-1-30
	SL 4-1-31
l) Firing the switchback on the opposite side of the road	
	SL 4-1-32
	SL 4-1-33
m) Ensure adequate burn zone established above switchback	
n) Edge fire the upper segment of the switchback to the apex of turn	
	SL 4-1-34
o) Slowly edge fire the lower segment of switchback	
1) Ensure no head fire crosses the road	
2) Allow adequate burn zone to develop along switchback before continuing to fire down road	
D. Changing Fire Environment Factors	

PRESENTATION	APPLICATION
E. Changing weather 1. Wind changes a) Fronts b) Thunderstorm downdrafts c) Surfacing of winds aloft d) Variation over the terrain e) Diurnal patterns (ex: up/down canyon) 2. Relative humidity and temperature changes 3. Fuel variations	**SL 4-1-35**
F. Changing fire behavior 1. Intensity changes can affect firing techniques, and safety a) Deeper burned zone b) Larger safety zones	
G. Multiple strips can become unnecessary	ACTIVITY: Using the Student Information Sheet, have the students come up with the techniques to fire out a saddle. Have them explain how they as igniters would fire the saddle. ANSWER: Establish check lines. Start igniter(s) on both sides of the saddle,

PRESENTATION	APPLICATION
	simultaneously edge fire down into the center of the saddle.

SUMMARY:

To be effective and safe, a firing operation must be well planned, monitored, and controlled. It must be based on the realities of the fire environment and of the available resources and finished within the amount of time dictated by the fire environment.

EVALUATION:

The student will complete a written quiz at a time determined by the instructor.

ASSIGNMENT:

Review your notes and read the appropriate section(s) in the student manual. Study for the next session.